GRADING

AND

LABELING

OF

MILK AND CREAM

ISSUED BY THE

BOSTON CHAMBER OF COMMERCE

AUGUST, 1916

PREPARED BY THE

COMMITTEE ON AGRICULTURE

OF THE

Boston Chamber of Commerce

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INTRODUCTION

A report entitled "Investigation and Analysis of the Production, Transportation, Inspection and Distribution of Milk and Cream in New England," was issued by the Committee on Agriculture in July, 1915, as a result of its two years' inquiry into the situation.

Three editions, totaling 50,000 copies, have already been distributed and a fourth edition is in preparation.

This "Milk Report" as it is commonly referred to, outlined the facts and difficulties of each phase of the industry. Six specific recommendations were made to overcome the difficulties:

1. Grading and labeling of milk and cream.

2. Establishment by producers of country receiving stations wherever practicable.

3. Improvements and rearrangement in the present types of farming operations.

4. Substitution of the open-car system of transportation for the leased car system.

5. Several improvements for increasing the efficiency and reducing the cost of city distribution.

6. Advertising the food value of milk and its derivatives.

The Interstate Commerce Commission, after many hearings on the New England milk transportation methods early in 1916, has ordered the leased car system abolished and the per-can open-car system installed on October 1, 1916.

The National Dairy Council has collected a fund and is beginning to advertise the food value of milk and its derivatives in many papers and magazines. The Massachusetts State Dairy Bureau, firms and individuals, are beginning to advertise in a similar way.

Thus, two of the six recommendations are already being put into effect.

In this pamphlet, the first of a series, based upon the four remaining recommendations of the Milk Report, the committee will confine itself to describing in detail the system of grading and labeling of milk and cream actually in use in some of the cities in the United States, and making suggestions showing how all sizes and types of communities could adopt grading and labeling if they desire to do so. Comment will also be made on standardization and systems of buying in so far as they relate to the problem of grading and labeling.

It hardly need be said that the grading and labeling of food products is not a new idea. For many years the law has required that all feeds and fertilizer should be labeled to show their chemical analysis and that the containers should show their contents. Many states under their pure food laws require that certain packages shall be labeled to show the net weight and kind of contents. A short time ago several New England states passed uniform laws providing for compulsory grading of apples.

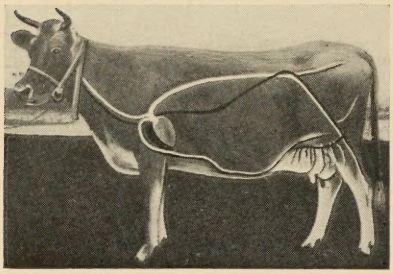
The recommendation that milk and cream be graded and labeled is simply in keeping with the general trend toward better food and greater safeguards for the public health, combined with greater efficiency for producer, distributor and consumer. Nor will they be difficult of adoption by locality, firm or individual be they large or small. It is earnestly hoped that this pamphlet will be read with a view of seeing how one of the difficulties in the milk situation can be remedied without hardship to any and to the benefit of all concerned.

The committee has drawn from many sources for the information contained in this pamphlet, and wishes to express its thanks to all those who have so courteously given their assistance.

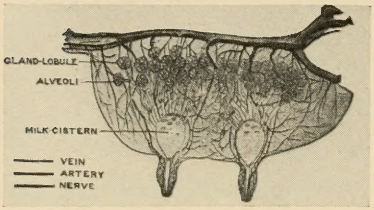
As in the Milk Report. the index in this pamphlet has intentionally been omitted, as the discussion must be treated as a whole and the various parts considered in their relation to the other parts if a clear understanding of the entire subject is to be obtained. For this reason, the reader is cautioned against reading one part and considering it to the neglect of the other related parts.

How Milk is Produced

The Dairy Cow is a machine which manufactures or converts feed and labor into milk, calf and manure.

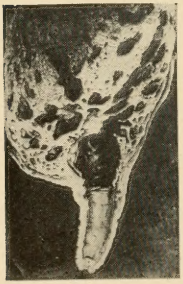


The cow's heart pumps blood to all parts of the body, supplying large amounts to the udder. The blood is continually replenished from the feed the cow eats. The light lines are arteries and the dark colored ones are veins.



Gland-Lobule — Small mass of tissue
Alveoli — A small cavity-cell

The cow's udder while similar to a large sponge in makeup, may be likened to an inverted bunch of grapes. The individual grape is similar to the hundreds of little cells in the cow's udder, around which are blood veins containing the blood pumped from the heart. These little cells transform the blood into milk. The little stem which holds the grape to the main stem is like the duct which carries the milk from the cells to the larger gland which is similar to the main stem of the bunch of grapes. This large gland leads into the milk cistern or reservoir.



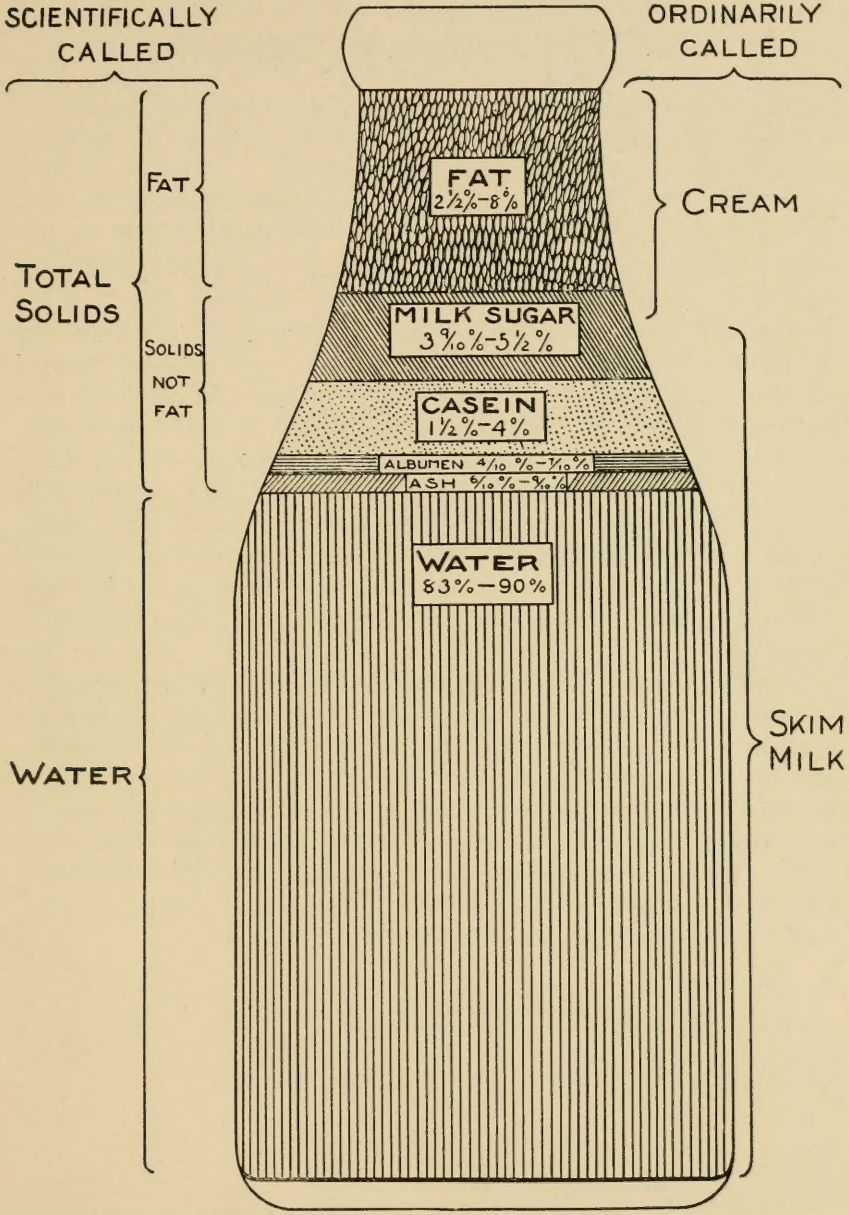
An enlarged quarter section of the udder

By means of hand pressure or mechanical suction, the milk is drawn through the teat from the milk reservoir. It is thought that part of the milk is manufactured at the time of milking and a part during the intermediary period. Individual cows vary to a great extent, not only in the quantity of milk they produce but in the quality, that is, the amount of butter fat (cream) and solids not fat (skim milk.) See page 5 diagram of the variation of these constituents in a quart of milk, also page 15 for description as to its meaning and effect.*

*(For further study see description of milk making in the the first few pages of Decker's book on "Cheese Making;" McKay & Larsen's book on "Principles and Practice of Butter Making;" Rosenau's book on "The Milk Question;" also the full discussion by Dr. Wm. Ernst of Munich in his book on "Milk Hygiene," published by Alexander Eger of Chicago. All students and those particularly interested should have these books.)

VARIATIONS IN THE CONTENTS OF MILK DRAWN FROM THE COW

Compiled from data on several hundred tests made by Hermann C. Lythgoe, Analyst of the Massachusetts State Department of Health. See page 15



KNOW WHAT IS IN YOUR MILK AND CREAM

Grading and Labeling tells the story—Demand it

THE SITUATION IN GENERAL

The grading and labeling of milk is not a theory. In many places it is in practical use. It has proven to be a success in New York, the largest city in the United States.

In 1913, New York City passed an ordinance requiring that all milk and cream should be graded by the City Board of Health and bear a label stating the grade.* The grades are A, B and C, and the label must state whether the milk or cream is raw or pasteurized. Now, in doing this, New York had a big and difficult problem with which to contend at the outset. Its milk and cream supply comes from a wide area and a very large number of farms, over sixty thousand in number, a large percent of the milk and cream from these being collected at twelve hundred country receiving plants. Four hundred and fifty of this number pasteurize the milk or cream when received from the farmers at the plant in the country. Shortly after New York adopted the system, the New York State Department of Health issued an order that all milk and cream sold in any municipality in the state must be graded and labeled.

New York City is not the only municipality having official grading and labeling. Other cities outside of those in New York State that have come to the notice of the committee as having such official systems are Newark and Jersey City, New Jersey; Richmond, Virginia, and Kansas City, Missouri. Other cities where milk is being graded, not because of any official regulation, but rather because of the demand for it, are Hartford, Stamford, Norwalk and Bridgeport in Connecticut; Philadelphia, Pennsylvania, and a number of other places.

***Present Standards for Grading in New York City**

	Bacteria Count		
	Before Pasteurization	After Pasteurization	Barn Score
Grade A, raw	Milk, 60,000 Cream, 300,000		75
Grade A, pasteurized	Milk, 200,000	Milk, 30,000 Cream, 150,000	68
Grade B, pasteurized, outside of city	Milk, 300,000 1,500,000 in city	Milk, 100,000 Cream, 500,000	55
Grade C, pasteurized, to be sold for manufacturing purposes only.	No limit	Milk, 300,000 Cream, 1,500,000	40

(All milk and cream except grade "A" raw have to be pasteurized.)

Present Condition in New England

In New England grading and labeling of milk and cream, outside of the Connecticut cities mentioned, are practically unknown and, in those few places where they are practiced, there are no laws specifying standards for the grades under which the milk and cream are sold. Under such a condition the sale of milk and cream by grades is simply catering to the demands of customers and does not give them the protection they would receive were the standards established by law.

On the other hand, inspection has, in many places in New England, been carried to extreme with little good results. Undue emphasis has been laid upon the inspection of equipment and methods employed in the production of milk while inspection of the product has been more or less neglected. Unnecessary requirements to be observed in the methods of production have been enforced and in many localities there has been some duplication of inspection, while in other places there has been no inspection whatever. Nevertheless, the milk produced in the latter places comes into direct competition with that produced in the sections where the inspection is rigid.*

Such a condition is intolerable. The uninspected milk may or may not be fit for use. So may the milk coming from places where **the inspection has laid emphasis entirely** on the equipment and methods and not on the product. Under a grading system where there is proper inspection of the product, a purchaser of Grade A milk would be certain of getting that quality of milk. The milk under existing conditions may have a range of hundreds of thousands in its bacteria count, regardless of the enticing labels, "Selected Milk," "Inspected" and the like.

Some Advantages of Grading and Labeling

By having the container labeled to show the grade of milk or cream and whether it is raw or pasteurized, **everyone is enabled to trade in the particular product which he desires to buy or sell,** the producer or dealer can sell exactly the kind of milk his customer desires, and the consumer gets what he pays for.

*The Report of the Special Milk Board of the Massachusetts State Department of Health contains an extensive summary of the character and extent of the local milk inspection in Massachusetts. The Massachusetts Legislature has ordered 4,000 copies printed, to be ready for distribution late in 1916. Application for extra copies should be made to the Massachusetts State Department of Health, Boston, Mass. Also see article on "Bacterial Testing Versus Dairy Inspection" by Dr. Charles E. North, in the American Journal of Public Health, 755 Boylston Street, Boston, Mass. Vol. 6, No. 6.

Food Value and Health Phase

Milk and cream are one of our most economical and valuable foods. Good, clean milk and cream are, therefore, essential to the public health, and it is the duty of every community, large and small, to have its milk supply properly safeguarded.

The health phase is not the only one to be considered. Greater cleanliness of the product is a real asset to the producer and distributor. Greater cleanliness means a better product, and a better product commands a higher price.*

The Milk Report on Grading and Labeling

There are three facts the consumer should know about the milk he is buying. First, he should know what its sanitary character is, that is, whether it is loaded with bacteria or whether it is practically free from them. Second, he should know what its chemical composition is, that is, whether it contains very little cream or butter fat, or whether it is called rich milk. Third, he should know its age. Consumers should not buy milk a week old in the belief that it was produced only the day before purchase.

The Milk Report pointed out how these facts can be determined. It suggested that every container of milk and cream should be labeled to show**

1. Sanitary character, i.e., bacteria count.
2. Butter fat content, i.e., amount of cream.
3. Date of production.
4. Date of pasteurization, if pasteurized.

Already in the places where the law requires grading and labeling, all these facts are shown **with the exception of the butter fat content.** In some instances this is shown, but the law does not require it.

Points the Law Should Cover

Labeling milk and cream for its sanitary character, that is, showing Grades A, B or any other that may be established, thus showing the maximum number of bacteria permitted in the product, should be done under a licensing system, in the control of the local and state boards of health. A law should be enacted giving them power to make such rules and regulations for grading and labeling as they might consider advisable, after hearings and conferences with the parties affected or interested.

*Page 45 of the Milk Report gives the essentials for making clean milk and cream.

**Skim Milk, Homogenized cream, milk and cream powder, should be so labeled and their sanitary character indicated. In Homogenized cream, milk and cream powder, the butter fat should also be indicated.

Labeling to show the butter fat content is not a subject of official health regulation. This is purely a commercial matter and competition will probably force all distributors to take it up, for it is not likely that consumers would buy an unguaranteed product if a product that was guaranteed could be obtained.*

At present there are varying state requirements in New England as to the legal minimum chemical standard for milk. This minimum standard exists to protect the consumer against adulteration.**

Labeling to show the date of production and the date of pasteurization is probably another matter which would be taken care of by competition, and therefore would require no legislation. It must be remembered, however, that the age of milk or cream does not necessarily indicate the quality, i.e., a milk or cream several days old which was clean to begin with and had been kept under proper refrigeration would generally be of a much better quality than a product a few hours old which had been kept at a high temperature. **More emphasis should be laid on the final bacteria count than on the age.**

The Change Must Be Gradual

It is not expected that the suggested changes could be made in a moment, nor is it desirable. **They must be brought about step by step in order that they may be worked out to suit the conditions of the locality and that people may have plenty of time to understand them.**

Determining the Sanitary Character or Bacteria Count

BACTERIA are minute organisms of vegetable origin which multiply rapidly in milk and cream because it is an excellent food for them. When the temperature of milk or cream is 60° or more, moisture and heat conditions are created which are extremely favorable to the growth of bacteria. Bacteria are, practically speaking,

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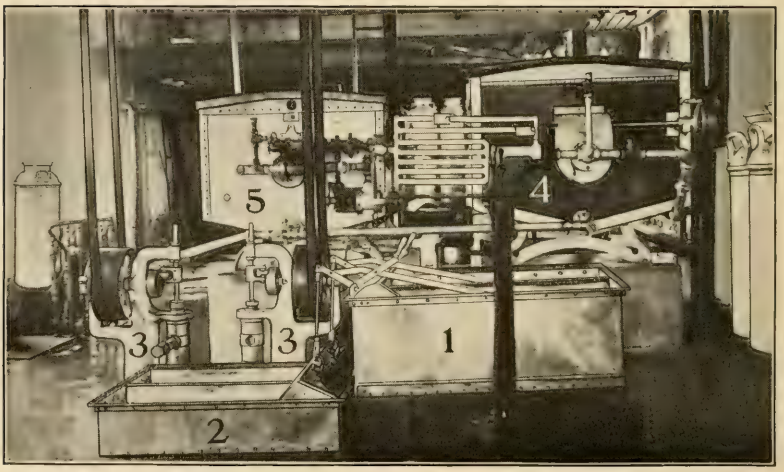
*Legislation would have to be passed providing for the punishment of anyone guilty of selling milk or cream below the standard stated on the label, being understood that in some states the pure food laws do not include milk. It should also provide that where milk and cream were labeled the minimum chemical legal standard need not apply.

**Standards all over the country vary to a ridiculous extent. Report of Commttee "Official Dairy Instructors' Association" on variations governing sale of milk in 511 cities in the United States of 5,000 to 25,000 population shows: Solids not fat 8.5 to 9.5; Total solids 10.5 to 13; Fat 3 to 3.7; Fat in cream 10 per cent to 25 per cent; Total Bacteria permitted 50,000 to 1,000,000; Temperature 45 degrees to 77 degrees F. Not salable 8 to 60 days previous to calving. Not salable 3 to 21 days after calving. See page 5.

Those interested should secure the leaflet of the Bureau of Animal Industry, U. S. Dept. of Agriculture, issued on May 1, 1916, on "Legal Standards for Dairy Products." Also see "Milk Report" page 41.

Type of milk and cream station receiving both A and B milk

EXTERIOR



INTERIOR

1. Two compartment receiving tank on scales for Grades A and B
2. Two compartment dump tank with separate pumps (3)
4. Grade A tank
5. Grade B tank

(Nos. 4 and 5 cool the product and can pasteurize if necessary)

LABORATORY FOR EITHER CITY OR COUNTRY

1. Steam heater for preparing agar. 2. Sterilizer. 3. Table for preparing samples to plate. 4. Incubator

found everywhere. They may come from ordinary dirt or dust, or from diseases such as typhoid, tuberculosis, diphtheria, scarlet fever and septic sore throat.

The making of a bacteria count is not difficult when a person has been properly trained in a commercial bacteriological laboratory.*

Making the Count

Samples of milk or cream are diluted with sterile water, ninety-nine parts of water to one part of milk.** A small measured amount of the solution is placed on a glass plate four inches in diameter. Agar, a transparent gelatinous substance containing beef tea and other food to make the bacteria grow, is added. This fastens the bacteria in place. The plate is then placed in the incubator for 48 hours, at about the temperature of the human body. At the end of this time the individual bacteria have multiplied into colonies and it is a comparatively simple matter to count the number of colonies present so as to ascertain into which grade the milk or cream will fall.***

It must be understood that the exact number of bacteria cannot be counted, but they can count them within ten to fifteen per cent, or close enough so that it can be easily ascertained if milk classifies under 10,000, under 50,000 under 100,000 or under 1,000,000.****

Laboratory Equipment and Cost

Laboratories can be installed for $250 for a small municipality and up to $5,000 for a very large city, including the cost of equipment, consisting of the necessary glassware, sterilizers, incubators, etc.

It has been suggested that municipalities with populations of less than 20,000 could not afford to grade milk. This is not true. Any city or town with a population of 5,000 or more can afford to have its own grading station, and there are instances of cooperative

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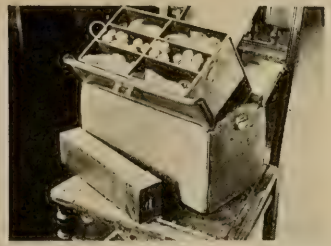
*There are many places where young men and women can be trained to make bacteria counts in two or three months' time.

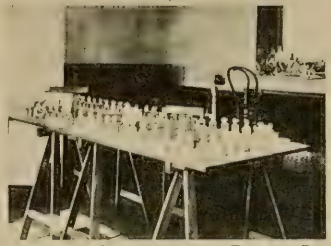
**This is one of a number of ratios that can be used.

***In examining raw (unpasteurized) milk, microscopic methods are sometimes used. Write New York State Experiment Station, Geneva, N. Y., for their technical bulletin No. 49 on "Counting Bacteria By Means of a Microscope," sometimes termed the Breed Method. Another is the Slack Method, which is described on pages 327-33 in the "American Journal of Public Health for 1910."

****See Reprint No. 295 from the Public Health Reports, U. S. Public Health Service, issued August, 1915, for Prof. H. W. Conn — treatise on "Standards for Determining the Purity of Milk."



SAMPLES FOR ANALYSIS BROUGHT TO THE LABORATORY IN AN ICED CASE



SAMPLES ARRANGED AND NUMBERED FOR THE TEST

DILUTING THE SAMPLES WITH STERILE WATER

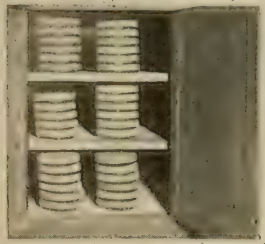
THOROUGHLY MIXING BY SHAKING

MEASURING OUT ONE CUBIC CENTIMETER FOR PLATING

TRANSFERRING TO THE GLASS PLATE (PETRI DISH)

ADDING THE GELATINOUS SUBSTANCE AGAR (PLATING)

DISTRIBUTING THE CONTENTS EVENLY IN THE DISH



INCUBATOR (DOOR OPEN) SHOWING ARRANGEMENT OF PETRI DISHES

COUNTING THE COLONIES OF BACTERIA

PLATE WITH LOW BACTERIA COUNT (CLEAN MILK)

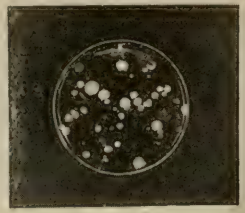


PLATE WITH HIGH BACTERIA COUNT (DIRTY MILK) OR OLD MILK

MAKING BACTERIA COUNT

arrangements between five to ten cities and towns under which they combined to maintain a laboratory where the grading of milk for all places was done. Such an arrangement materially reduces the cost.

A city of five million people reports that the per capita cost each year for grading milk is two cents. Another city of 300,000 inhabitants reports a per capita cost of 2¾ cents per annum, another of 156,000 inhabitants states it costs only 3 2/10 cents per person per annum, and a city of 38,000 figures it costs 7 ¼ cents per capita per annum. It is certainly not unreasonable to ask a city to spend what amounts to two street carfares each year for each inhabitant to protect and safeguard something so important to the public as a city's milk supply. **The experience of cities where grading has been adopted furnishes conclusive proof that no city can properly refuse to grade its milk on account of the cost.***

Number of Grades

Obviously, if a grading system is to be thoroughly workable and practical, there must not be too many grades. Experience in other places has already demonstrated that three grades are sufficient for a city's milk supply and they are usually designated as Grades A, B or C, raw or pasteurized as the case may be.** Some places have tried to have a grade lower than C, others have used such terms as "inspected," "guaranteed" but this has not worked out well in practice.

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*For further information as to these cooperative laboratory arrangements see Milk Report, page 48, also write the Massachusetts Institute of Technology, Dept. of Biology and Public Health.

Arrangements have been made by the **Franklin County (Mass.)** Farm Bureau in cooperation with the Massachusetts State Dairy Bureau, to open in September of 1916 an educational laboratory to do bacteria counting for milk sent in by the people of that county.

Many **milk dealers** are today running bacteria counts in their country milk stations. Some of these stations handle enough milk to warrant their maintaining their own laboratories, but where such is not the case **arrangements have been made for one laboratory to care for the milk received at three or more stations,** thus cutting down the per station cost to a reasonable amount. Such plants are located at Oxford, Kelton and West Grove, Penn.; and FAIR HAVEN, VERMONT. Secure July, 1916, edition of "Milk Reporter," published at Sussex, N. J., and see page 12 for letter of Dr. Haven Emerson, Commissioner of Health of New York City, giving list of the many country Grade A plants supplying New York City.

Grading and labeling are adaptable to both city and country conditions of all kinds. They can be successfully carried on even in communities where a relatively small amount of milk is produced, and there are few sections where, within a radius of ten miles the milk produced by twenty to forty farmers cannot be collected at one place.

****Pasteurization.** Many leading authorities are in favor of the pasteurization of all milk, while some are opposed to it. It is true that in cities a large percentage of the milk and cream is pasteurized, but this is, after all, a matter which should be left to the decision of the local boards of health.

Scientific pasteurization is heating the milk or cream to 145 degrees and holding for twenty-five to thirty minutes. It kills the harmful bacteria from such diseases as typhoid, diphtheria, scarlet fever, tuberculosis and septic sore throat, and renders the product safe. For further information on this subject, read the article "Pasteurization of Market Milk," by Prof. Otto Hunziker in the June (1916) number of "The Milk Trade Journal," published in Waterloo, Ia. Write Albert Lea, State Creamery, Albert Lea, Minnesota, for Bulletin No. 63 of the Minnesota Dairy and Food Department on "Pasteurization of Cream for Butter Making."

Bacterial Limits

The local boards of health in consultation and cooperation with the State Department of Health should determine the bacterial limits to be allowed each grade. It would not be wise to attempt to set any standards as to the number of bacteria allowable in a particular grade for all sections of the country, because of the varying conditions not only in production, but in distribution and consumption. Each state and community should set its own standard, **but they should aim to have these standards as nearly uniform in their essentials with those of other communities and states as conditions will permit.***

Some might object that in having only three grades, milk and cream of varying qualities might be sold under one grade classification, if the bacterial count did not exceed the legal maximum. This is not an objection. It simply means there could be several degrees of excellence in one grade. For instance, if Grade A milk had as its maximum legal bacterial count 60,000, those producers and distributors who had milk averaging under 10,000 could, and undoubtedly would, advertise that fact.

Butter Fat or Cream

Milk is composed of butter fat, milk sugar, casein, albumen, ash and water. (See diagram, page 5.) It has been found that the constituent of milk which varies the most in a given quantity is the butter fat. In 100 pounds of milk the butter fat or cream, as the consumer probably knows it, has been known to vary from two and a half per cent to eight per cent, but the usual variation is from two and eight-tenths per cent to five and five-tenths per cent. This variation has been caused by the developments of breeds, such as the Ayrshires, Jerseys, Holsteins, Guernseys and the like. The scientific causes are not essential to this discussion, but the fact remains that the variation exists.** It is very desirable, therefore, that milk and cream should be tested to determine their degree of richness, i.e., butter fat content.

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*Those interested in the detailed requirements and regulations as to grading and labeling of milk and cream should write to the New York State Department of Health, Albany, N. Y., and the other cities mentioned, for copies of their regulations.

**For further study on this point see U.S. Department of Agriculture, Bureau of Animal Industry, Bulletin No. 157 on "Variations in the Composition and Properties of Milk from the Individual Cow;" Bulletin No. 156 on "The Influence of Breed and Individuality on the Composition and Properties of Milk;" Bulletin No. 155 "The Influence of the Stage of Lactation on the Composition and Properties of Milk," all these Bulletins by Prof. C. H. Eckles and Prof. R. H. Shaw, also Textbook on "Milk Hygiene" by Dr. William Ernst of Munich.

MAKING BABCOCK TEST FOR BUTTER FAT CONTENT

No. 1. Drawing sample (17.5 c.c.)

No. 2. Filling test bottle

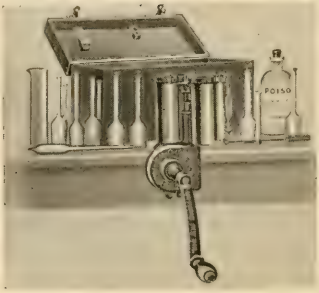
No. 3. Adding (17.5 c.c.) sulphuric acid

No. 4. Whirling in Babcock Tester (5 min.)

No. 5. Adding hot water
(It is then whirled another min.)

No. 6. Reading the butter fat content

No. 7. Butter fat column in graduated neck of the bottle



No. 8. Babcock test traveling outfit

No. 9. Steam tester for large plants.

How to Test for Butter Fat

Twenty-five years ago, a machine known as the Babcock Tester was invented to determine the butter fat content of milk or cream. A composite sample of the milk or cream is thoroughly mixed and a certain amount of this is then mixed with an equal amount of sulphuric acid. The acid dissolves the casein and sets the butter fat free. This mixture is placed in the machine and is whirled for five minutes. Water is added and a consequent whirling in the machine forces the butter fat into the graduated neck of the testing bottle and the percentage of fat can readily be measured.*

Butter Fat Determines the Commercial Value

Because of the great variation now found in the composition of milk and cream,** many dealers are buying on the butter fat basis, that is, in purchasing one hundred pounds **they pay for the value of the butter fat content plus the value of the skim milk.** The solids not fat—milk sugar, casein, allbumen and ash — plus the water which we ordinarily call skim milk do not vary as much as the butter fat content, and the **commercial value** of skim milk which comes from a 3 per cent milk is practically the same as that from a 4 per cent or 5 per cent milk, although the milk sugar, casein, albumen and ash content may vary to some extent.

Commercially cream is the most valuable part of the milk, and it is therefore essential that the percentage of cream in milk should be known. This is particularly true when you stop to consider two facts. First, the greater part of all milk produced is used for manufacturing purposes, only a small part being sold as whole milk, or for home consumption. Second, the milk that is not sold as whole milk, but rather for manufacturing purposes, is converted into cream and its derivatives. It should also be noted that milk carried by distributors as a surplus is converted into cream, butter, cheese, condensed milk, etc.

State Standards for Butter Fat, Solids not Fat and Total Solids

Many states long ago established legal standards for milk and cream, requiring that the product should contain not less than cer-

*The cost of the machine is low and within the reach of almost everyone, the expense of both machine and equipment ranging from $5 to $35, according to the size. In order to officially be regarded as a milk tester, one has to receive a certificate from a state college of agriculture, which is obtained after an examination. Make application to your State agricultural college for further detailed information.

**It is practically impossible to obtain pure butter fat (cream) from milk—always some skim milk (solids not fat) is in combination with the cream (butter fat). The grades usually run from 10 per cent to 44 per cent pure butter fat.

tain stated amounts of the various constituents. This was all right for the old fashioned cow, but now some of the breeds will not produce milk containing the requisite amount of butter fat.* As we have already said, the amount of butter fat in any cow's milk is determined by nature. Change or increase in feed may increase the amount of milk, but it will not materially affect its butter fat content. The milk may be perfectly good, but man arbitrarily rules that because nature and breeding have put less butter fat into a certain cow's milk the product of that cow shall not be sold. Why should a man be deemed a criminal for selling milk of a low butter fat content, when it is the pure product of a healthy cow? The object of the law, of course, is to prevent in general the undue lowering of the standard of the butter fat content of milk. **But is it not evident, that this end can be much better accomplished by grading, and after all is not the consumer the one to decide what grade of milk he wants?** That is if a purchaser wants to buy 1 per cent milk, he should be able to, as long as he knows that he is getting only 1 per cent milk.

Standardization

Mixing milk and cream to obtain a butter fat or cream content of a certain definite known per cent is what is known as "standardizing." At the present time many states have laws which seem to prohibit such a process, as they say that nothing shall be taken from, or added to, the natural cow's milk. These laws were passed to prevent watering of milk, but now they obviously work an unnecessary hardship.**

This is a condition which should not be allowed to continue. **The law should be changed to permit the standardization of milk and cream.** A provision stating that standardization could be performed only by the addition of cream, milk or skim milk

*Some have suggested that farmers having herds testing below State standards should buy cows testing high in butter fat to bring their milk up to standard. **It is not sound judgment to advise farmers to mix their herds. They should specialize on some one breed and let the milk produced be sold for what it is worth. It is also true that there is a legitimate demand for milk testing under 3 per cent fat as there is over 3 per cent fat.**

**In making its investigations preparatory to issuing the Milk Report, the committee found that one of the main difficulties in the way of solving the problem of the milk situation was the lack of a standardized product. The committee, in its report, said:

"The value of a particular quart of milk or cream depends on its cleanliness and the percentage of butter fat and solids not fat which it contains (see diagram on page 5). These percentages vary greatly with different quarts. Butter fat can be readily measured when the farmers offer their product to the dealer, and the farmers or dealers can, by proper mixing or standardizing control it in the product which they offer to the public. These percentages, together with the cleanliness of the product, should govern both the price paid by the consumer and that received by the producer."

would still safeguard the public against the watering of milk, for by means of the refractometer any appreciable amount of water added can be readily detected.*

There have been some objections to standardization, particularly among small distributors and producers, who claim that they can not afford to standardize their milk, and that their business therefore would be thrown into the hands of the big dealers. **Within the past few years machinery for both standardizing and pasteurizing milk has been put on the market at a cost so low that the small dealer can now pasteurize and standardize his milk practically as efficiently as the large dealer.**

Methods of Standardization

Milk may be standardized in three ways.

First — by mixing milk of high butter fat with that of low butter fat, thus obtaining a more uniform butter fat content. Example: Forty farmers send in 100 quarts of milk each. The milk from twenty farmers contains only three per cent butter fat. The milk from the other twenty contains four per cent butter fat. The dealer desires to sell three and one-half per cent milk. By mixing the milk from all forty farmers, he obtains a product containing three and one-half per cent butter fat.

Second — by adding cream to raise the standard of the milk or by adding skim milk to lower the standard. Example. If milk is received testing only three per cent butter fat, and the dealer desires to sell three and one-half per cent milk, he adds enough cream to bring the milk to that standard. If the butter fat content of milk is too high, he simply adds skim milk in sufficient quantity to reduce it to the desired standard.

Third — by separating all milk as soon as received into cream and skim milk. The cream and skim milk are then mixed to give the milk or cream the standard desired.

Any of these methods may be used, but the latter two seem to be most favored. Some large distributors claim that the last method is best, on the grounds that it is more efficient and economical than the other two.**

You will probably recall that earlier in this pamphlet it was stated that standardization of milk and cream is illegal. It is, but regardless of this fact, most of the cream and a considerable portion of the milk supply of the country is standardized. **There is no good reason why it should not be,** for, as has been pointed out, the old objection of health officials that permission to standardize would allow watering does not hold good, for the refractometer will

*Write the Dairy Division of the U. S. Dept. of Agriculture at Washington, D. C., for additional information as to the use of the refractometer and other methods of determining added water.

**Tables and formulas are issued by which one can readily figure how much skim milk or cream needs to be added to milk or cream of a known butter fat content to make milk or cream of a certain desired butter fat content. Apply to your State Agricultural College for information as to methods of standardizing.

readily detect any such adulteration. It is to be noted that in some European countries the standardizing of milk is legal, and in such places milk from 1 per cent butter fat up can be purchased.

Adopting the Grading and Labeling System

The average consumer, and he constitutes a very large per cent of the country's population, does not take very kindly to a sudden change from any system to which he has been accustomed to another which is new to him. This is not at all strange. Usually he opposes the change because he knows little or nothing about the new system and is, therefore, naturally cautious in adopting it.

The process of educating the public to a full understanding and appreciation of the value of grading and labeling could probably be best conducted through those agencies which represent the consumers, distributors, health officials and producers.*

Illustrated Lectures

Mere talk on a subject like this does not usually go very far. People like to see with their own eyes what is being done in other places. Seeing is frequently believing, and if you can visualize your argument, you have gone a long way toward convincing the average man.

Following out this thought, illustrated lectures have been prepared showing in an exhaustive way the details that can only be touched upon in this report. They point out graphically the present problems of the community's milk supply and how the introduction of an official system of grading and labeling will help to solve them; what the effect will be on the consumer who buys at wholesale or at retail, and what the effect will be on large dealers, small dealers, large producers and small producers.**

Changes Have Taken Place

Improvements in refrigeration, rendering possible long hauls of milk and cream, and the developments in the use of milk and cream for manufacturing purposes, have brought about many changes in the industry in the last few years. Changes and developments in any industry bring up new problems which must be met and solved and although they have arisen in the milk and cream industry, they have neither been met nor solved.

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*They are the commercial associations, the consumers' associations, women's clubs, loca boards of health, milk dealers' associations, milk package exchanges and producers' associations.

**The committee has prepared slides and a lecture on the grading of milk and cream. Many state and local departments of health, as well as agricultural agencies and private individuals have similar data and are able and glad to assist in disseminating this information.

Appoint a Committee

A committee should be appointed to secure information concerning the details of operating a laboratory, and to decide after suitable investigation, what the limits of bacteria count for the local grades should be. This committee should preferably be composed of representatives of the local board of health and consumers', distributors' and producers' associations. The final step, of course, is the passage of an ordinance establishing official grading and labeling.

Buying Milk from the Farmer

Methods of buying milk from the producer are mentioned here, as they have real bearing on the grading and labeling of milk and the way in which it is sold to the consumer. In studying the milk situation, the committee found that milk was bought from the farmer in twenty-five to thirty different ways, and that this variation caused a great deal of dissatisfaction.* Unless there is a uniform method of purchasing milk and cream, some farmer who is producing a better grade is certain to be the loser, while if there is uniformity, those farmers now doing business in a more or less slack way and, therefore, producing only a medium product, will be stimulated to do better and turn out an improved product.

Principles to be Followed

The committee believes that the following principles should be laid down and followed:

1. The farmers should own their own cans.**
2. Milk and cream should be bought from the farmer by weight.
3. Prices paid should be so much for the butter fat or cream, and so much for the solids not fat called skim milk. Prices should also vary according to the bacteria count.***

*See "Milk Report" pages 20 and 21.

**This would generally only apply to places where the farmers send their product to a milk or cream station in their immediate vicinity. Owning the cans, the farmers are more careful of them and in not having to bear the expense of supplying cans, the dealers should be able to pay the producers a little more for their milk.

***Several methods are used — see any edition of "The Milk Reporter," published at Sussex, N. J., for Borden system of buying. Address Turner Centre Dairying Association, Auburn, Maine, for their annual report showing their system. Brief Summary of System Quoted:

Turner Centre Dairying Association, Auburn, Maine. Prices based on butter fat and skim milk content.

Average prices paid 1914 Butter Fat .35 a lb., skim milk 47-1/12c per hundred lbs.
1915 Butter Fat 35-1-6c lb., skim milk 42½c per hundred lbs.

A Spokane, Washington Dealer, 1916, Prices based on butter fat content and bacteria count.

Butter-fat per cent	Number of Bacteria: 50,000 to 75,000	35,000 to 50,000	25,000 to 35,000	15,000 to 25,000	10,000 to 15,000	5,000 to 10,000	Below 5,000
3.6	15½	15¾	16	16½	17¼	18½	20 cts. per gal.
3.7	16	16¼	16½	16¾	17¾	19	20½
3.8	16½	16¾	17	17¼	18¼	19	21
3.9	17	17¼	17½	17¾	18¾	20	21½
4.0	17½	17¾	18	18¼	19¼	20½	22

Borden Prices. Summer Contract Prices, 1916. Short Haul-Eastern Route

Butterfat %	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
April $	1.40	1.43	1.46	1.49	1.52	1.55	1.58	1.61	1.64	1.67	1.70	1.73	1.76	1.79	1.82	1.85	1.88	1.91

HOW THE BOTTLE CAPS LOOK NOW

Present Methods of Labeling Milk and Cream in New England

MILK

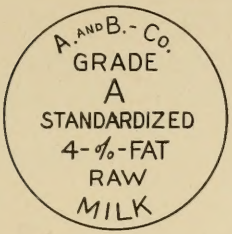
CREAM

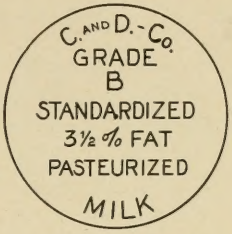
No statement or guarantee as to cleanliness or quality
Just take what you get

HOW THE BOTTLE CAPS OUGHT TO LOOK

Statements that should appear on the caps and should be demanded by you

MILK





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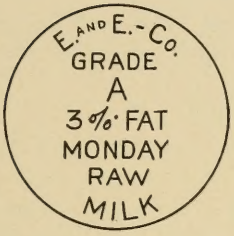
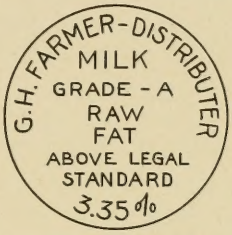
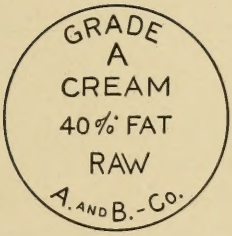
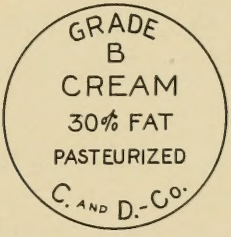
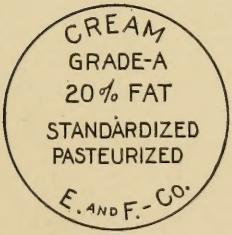


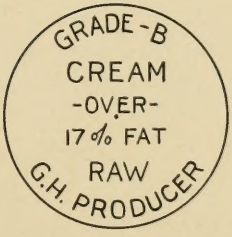


CREAM









1* The label of each milk and cream container should specify the grade — A and B or C—and the per cent of fat, if the product is standardized. This could easily be done on the cap inside of the centre circle, leaving the outside space for such matter as date or place of production, pasteurization, average number of bacteria count, from what breed of cows, medical certification, etc. But every label should show the sanitary character and the per cent of butter fat where the product is standardized, and if it is not standardized, the statement that the product is above the legal standard. This can be readily done by any producer or distributor.

Complete Knowledge Necessary

Complete knowledge of some of the more essential principles and facts is necessary if order is to be brought about. The points of which there should be greater knowledge are:

1. **Composition of milk and cream and their products.**
2. **Various demands for the butter fat content in the different lines of trade.**
3. **Variance of the butter fat content in the milk of cows according to the breed and individuality of cow.**
4. **Standardization; what it is and why it is necessary.**
5. **Process of making bacteria count and the Babcock test of milk.**
6. **Need of uniform legal standards for milk and cream, and labeling to show the sanitary character and butter fat content.***

Instruction Essential

It should be the duty of agricultural and other agencies interested to inform the public on these points, both by the distribution of literature and by instruction in schools. Certainly, very little progress can be made in putting the industry on a sound basis until the farmer and the general public have a thorough understanding of the product, the demand for it and the ways in which it is consumed.

The Public Should Demand Grading and Labeling

It has been previously stated that under an official system of grading and labeling, producer, distributor and consumer alike know exactly what they are dealing in. **Milk and cream should be labeled to show the sanitary character or grade and the butter fat content or cream value. The various trade names such as light, medium, heavy, breakfast or coffee cream mean little.** With the different dealers they describe varying percentages of butter fat and the consumers frequently receive a product from ten to twenty-five per cent less in butter fat than they believe they are getting. There is practically no other commodity bought and sold in the slipshod way that milk and cream are bought and sold. **Producer, distributor,** and **consumer** alike should demand and work for a grading and labeling system.

*Resolutions were passed at the 1916 Annual Meeting of the Vermont Dairymen's Association requesting their President to appoint a committee to cooperate with similar committees to be appointed by the other State dairymen's associations to draft uniform laws in regard to dairy matters. Resolutions were passed in Washington, D. C., May 6, 1916, by a meeting called by the National Dairy Union and National Dairy Council that "a committee should be appointed by the Secretary of Agriculture to frame a set of uniform rules and regulations for handling milk and cream," and that "it is the sense of this conference that all products so made should be so marked as to disclose the materials used in their manufacture."

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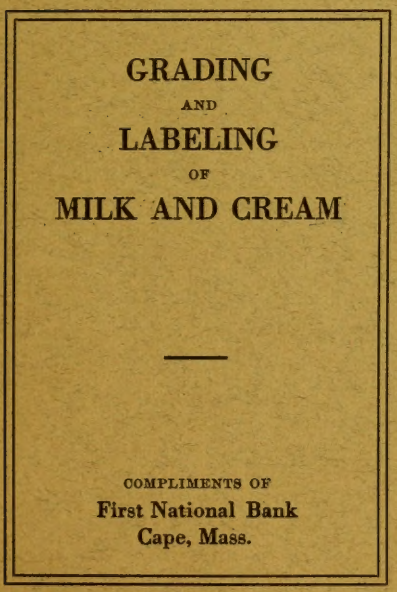

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